

Workshop Regarding Regulatory Fuels Activities

May 18, 2001

California Environmental Protection Agency



Air Resources Board

Agenda

- ✦ Introductions
- ✦ Development of amendments to CARB Diesel Regulations
- ✦ Evaluation of Diesel Fuel Lubrication Oils, Lubricity, and Additives
- ✦ Review of MTBE and other ether De Minimus Levels in CaRFG3 Regulations
- ✦ Ongoing Work on Permeation from the Effects of Ethanol in Gasoline
- ✦ Ongoing Work on Commingling from the Effects of Ethanol in Gasoline
- ✦ Discussion of Legal/Enforcement Issues
- ✦ Open Discussion
- ✦ Closing Remarks

Proposed Amendments Under Development California Diesel Fuel

- ✦ Lower CARB diesel sulfur limit to 15 ppm
- ✦ Applies to
 - On-road and off-road vehicle uses
 - Stationary sources (Air Toxic Control Measure)
- ✦ Necessary to implement diesel PM risk reduction plan

Proposed Amendments Under Development California Diesel Fuel (Continued)

- ✦ No changes to aromatic hydrocarbon specifications

Proposed Amendments Under Development California Diesel Fuel (Continued)

- ✦ Implementation concurrent with EPA rule - 2006
 - No phase-in
 - At this time, no provisions for small refiners

Amendments Being Considered for California Diesel Fuel

- ✦ Replace test method for determining sulfur content
 - Current test method ASTM D2622-94 (x-ray fluorescence) has detection limit and repeatability values too high for 15 ppm sulfur level
 - detection limit of 10 ppm
 - at 15 ppm sulfur in diesel fuel repeatability is +/- 9 ppm
 - ASTM D5453-93 (ultraviolet fluorescence)
 - is an equivalent test method
 - detection limit of 1 ppm
 - at 15 ppm sulfur in diesel fuel repeatability is +/- 2.8 ppm

Amendments Being Considered for California Diesel Fuel (cont.)

- ✦ Revise certified diesel fuel formulation procedures
 - Change sulfur specification in reference fuel (15 ppm)
 - Delete sulfate credit for candidate fuel
 - Add provisions to ensure candidate fuel and produced commercial fuels are comparable

Amendments Being Considered for California Diesel Fuel (cont.)

- Add provisions to ensure candidate fuel and produced commercial fuels are comparable (cont.)
 - candidate fuel subject to same required specifications and ranges as the reference fuel (e.g., API gravity, viscosity, distillation temperatures)
 - candidate fuel could differ from reference fuel by no more than one half of the permitted ranges
 - applies to new and existing certifications
 - exception: candidate fuel in excess of reference fuel ranges can be certified if applicant agrees that the certified diesel fuel formulation includes specification limits based on the candidate fuel

Diesel Engine Lubricating Oils

- ✦ Initiated study investigating sulfur, ash and other potentially harmful components in lubricating oils
- ✦ Following testing of industry/government work groups
- ✦ Two groups pursuing research:
 - Advanced Petroleum Based Fuels - Diesel Emission Control (APBF-DEC) Lubricants Work Group
 - Industry/government work group
 - Diesel Aftertreatment Sensitivity to Lubricant (DASL)
 - Consortium initiated by Southwest Research Institute (SwRI)

Status of APBF-DEC Lubricants Work Group

- ✦ Contract for initial phase of 3 phase program awarded in April to Automotive Testing Laboratory (ATL)
- ✦ ATL preparing test engine
- ✦ National Renewable Energy Laboratory (NREL) blending test lubricants
 - 12 additive packages using 4 different base stocks
- ✦ Initial program to characterize effect on engine out emissions of :
 - Lubricant base stock
 - Lubricant additives

APBF-DEC Lubricants Work Group

Phase I Testing

- ✦ Testing estimated start date: mid June
- ✦ ~ 6 month test program
- ✦ Emissions to be measured over 5 mode steady state cycle:
 - Gaseous emissions: hydrocarbons, NO_x, CO, CO₂, SO₂
 - Particulate matter (PM) characterization: total PM mass, soluble organic fraction (SOF), including fuel/lubricant contribution, sulfate fraction, polycyclic aromatic hydrocarbon (PAH) content, metals
- ✦ Oil consumption determined for each evaluation operating mode and checked routinely throughout test program

Diesel Aftertreatment Sensitivity to Lubricant (DASL) Consortium

- ✦ Formed by Southwest Research Institute to compliment APBF-DEC Lubricants program
- ✦ Objective: probe impact of sulfur and other lubricant/additive components (including zinc, calcium, barium, magnesium, boron, and anti-wear agents) on diesel emission control systems
- ✦ Being combined with SwRI Non-Thermal Catalyst Deactivation (N-TCD) research consortium - similar subject but different emphasis
 - N-TCD consortium to study catalyst poisoning mechanisms

Future Activities

- ✦ Status report in November 2001
- ✦ Possible regulatory action in 2006
 - Limit sulfur and/or ash content of lubricating oils
 - Apply to diesel engine lubricating oils for both on-road and off-road vehicles

Diesel Fuel Lubricity

- ✦ Refinery industry well versed in ensuring adequate lubricity for desulfurized fuel
 - Voluntarily maintaining 1994 Governor's Diesel Fuel Task Force minimum lubricity level
- ✦ ASTM Diesel Fuel Lubricity Task Force completing a major round robin program
 - Seeking to improve precision and response of lubricity measurement for additized fuel
 - Completed testing with 2 laboratory equipment test set-ups
 - Ball on two disks (BOTD)
 - Modified High Frequency Reciprocating Rig or Low Frequency Reciprocating Rig (LFRR)
 - Testing to continue with pump test set-up

Expect ASTM Lubricity Standard Proposal in December 2001

- ✦ Lubricity forum scheduled for September SAE meeting in San Antonio
 - Introduce ideas for ASTM lubricity standard
 - Explain why standard necessary
- ✦ ASTM Diesel Fuel Lubricity Task Force to propose lubricity standard at December ASTM meeting

Future Activities

- ✦ Status report in November 2001
- ✦ Possible regulatory action in 2002

Diesel Deposit Control Additives

- ✦ No diesel fuel additive requirements currently in place
- ✦ Diesel deposit control additives could reduce potential deposit formation in fuel systems and engines
- ✦ Keep engines closer to factory tolerances
- ✦ Minimize deterioration rate of engine-out emission levels
- ✦ Effects both criteria pollutants and toxics (PM)

Initiated Study of Diesel Fuel Additives

- ✦ Investigate the significance of diesel fuel system and engine deposits and the effect on emissions
- ✦ Investigate feasibility of deposit control additives - effectiveness and cost
- ✦ Possible regulatory action, if needed
 - Develop certification test procedure
 - Develop performance standard

CaRFG3 Issues

Gasoline Certification Fuel

- ✦ Plan regulatory update to the CaRFG2 certification fuel specifications
- ✦ Planning additional workshops in the near future
- ✦ Will work closely with auto, oil, and ethanol industries and the ARB Mobile Source Control Division
- ✦ Scheduled for consideration by the ARB Board in November 2001

MTBE Deminimus Levels

- ✦ Review current CaRFG3 MTBE deminimus limits
- ✦ Change current MTBE deminimus limits to oxygen content equivalent

Ongoing Permeation Emission Evaluation

- ✦ Contract awarded to investigate potential permeation emissions losses
 - Performed literature search for permeation rates with ethanol and non-ethanol gasolines
 - Confirms ethanol increases permeation emission losses
 - literature search results have been posted on our webpage
 - Gathering data on permeable fuel system materials in vehicle fleet to estimate statewide permeation emissions
 - Will design test program to evaluate permeation rates to increase available data
- ✦ Draft final report to be available near future

Ongoing Work on Commingling

- ✦ Board prohibited use of MTBE beginning December 31, 2002
- ✦ Federal oxygen requirement still in place
 - Ethanol will be only allowable oxygenate
 - 70% of California fuel
- ✦ Board directed the staff to further evaluate real-world impacts of mixing (commingling) ethanol and non-ethanol gasoline

Evaluation of Real-World Impacts

- ✦ ARB Commingling study
 - Establish ARB/Industry workgroup
 - Evaluate consumer refueling practices
 - Vehicle fuel sampling program

ARB/Industry Commingling Study Workgroup

- ✦ First meeting held April 27, 2001
- ✦ Discussed staff's data needs regarding consumer refueling practices
 - Industry members to report on availability of information from industry marketing data
 - Possibility of conducting public survey

ARB/Industry Commingling Study Workgroup (cont.)

- ✦ Discussed draft commingling study fuel sampling protocol
 - Draft protocol revised to incorporate use of cooling coil
 - Industry members to identify/recommend site locations
- ✦ Proposed Field Work
 - One week trial in Bay Area
 - One week of sampling in Bay Area, Los Angeles, and Lake Tahoe
- ✦ Next meeting later today

Legal/Enforcement Issues

Open Discussion

Closing Remarks